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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/757,471 | 01/15/2004 | Min-Chul Suh | 1514.1039 | 4143 |

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| EXAMINER | |
|---|---|
| GARRETT, DAWN L | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1774 | |

DATE MAILED: 09/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/757,471 | SUH, MIN-CHUL | |
| | Examiner | Art Unit | |
| | Dawn Garrett | 1774 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *20 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-16,19 and 20* is/are rejected.

7)☒ Claim(s) *8,17 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *1/15/04 & 7/20/06* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1. This Office action replaces the action mailed on September 13, 2006. Applicant's representative contacted the examiner on September 15, 2006 with regard to the action mailed on September 13, 2006, in which the examiner inadvertently considered a previous claim set rather than the claim set most recently submitted on July 20, 2006. The claim set submitted July 20, 2006 is under consideration in this Office action. Applicant's response time is being restarted with the mailing of this Office action.

2. An initialed copy of the June 19, 2006 I.D.S. was attached to the September 13, 2006 Office action.

3. Applicant amended claims 1-16 and added new claims 17-20. Claims 1-20 are pending.

4. Applicant previously elected with traverse the species of an electron acceptor material that is an aromatic compound having a nitro group and the species of an electron donor material that is an aromatic compound having a hydrogen. As stated in the previous Office action, the examiner maintains that the species are distinct and require a separate search. The number of species to search is a serious burden, because the searches for the species are not coextensive.

5. The replacement Figure 3 drawing received July 20, 2006 is approved.

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. The rejection of claims 2, 7, and 12 under 35 U.S.C. 112, second paragraph, is withdrawn due to the amendment and applicant's remarks.

8. The rejection of claims 11 and 12 under 35 U.S.C. 102(b) as being anticipated by Fujita et al. (EP 1017118 A2) is withdrawn.

9. The rejection of claims 1-10 under 35 U.S.C. 103(a) as being unpatentable over Fujita et al. (EP 1017118 A2) is withdrawn.

***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1, 2, 4-7, 9, and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Seo et al. (US 2004/0146744 A1). Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Seo et al. discloses electroluminescent elements comprising an first electrode, buffer layer, an EL film (emitting), and a second electrode (see par. 15). The buffer layer is deemed to read upon the hole injecting layer of claim 1 as it is described as having a high property of hole injection (see par. 16) and it is doped with an electron acceptor compound (see abstract). A specifically described acceptor material is formula [5], which is an aromatic group having two nitro groups (see par. 30). The EL laminate structure comprises further layers such as a hole transport layer, light emitting layer, a hole blocking layer and an electron transporting layer (see par. 69) with regard to claim 4. The thickness of the buffer layer (hole injecting layer) is 20-50

nm, which is within the range recited by claim 5 (see par. 67). The device may comprise a layer with an electron donor adjacent the cathode with regard to claim 6 (see par. 18). Donor materials include aromatic groups having hydrogens (see par. 35-48 and 75). Claim 9 is a product-by-process claim. It is noted that the layers may be formed by spin coating (see par. 67). With regard to claim 10, again the buffer layer is from 20-50 nm in thickness, which would also include a buffer layer adjacent the cathode (see par. 67).

### *Claim Rejections - 35 USC § 103*

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2000-150169 in view of Fujita et al. (EP 1017118 A2). JP '169 discloses organic electroluminescent devices having a luminous (emitting) layer and a hole injecting layer between an anode and a cathode (see abstract). The hole injecting layer is doped with an electron accepting compound (also referred to as an electron receptiveness compound in the reference) (see abstract). JP '169 fails to teach the nitro containing compounds of the current acceptor species; however, JP '169 does teach the electron receptiveness compounds include compounds such as TCNQ (see par. 19-20). Fujita teaches electron acceptor materials for an EL device include compounds having a nitro group such as TNF (trinitrofluorenone) and DNF (dinitrofluorenone) as well as compounds such as TCNQ (see par. 48). It would have been obvious to one of ordinary skill in

the art at the time of the invention to have used TNF or DNF in place of TCNQ in the JP '169 device, because Fujita et al. teaches TNF and DNF are electron acceptor materials just like TCNQ, which is clearly taught as suitable by JP '169.

With regard to claim 3, the amount of electron receptiveness compound in the hole injection layer is 0.1-50% (see par. 18). With regard to claim 4, the devices may include further layers such as a hole transportation layer (see par. 57 and Figures). The hole injection layer is formed by spin coat and is 10-200 nm in thickness per claim 5 (see par. 49-50).

14. Claims 11-16,19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujita et al. (EP 1017118 A2). Fujita et al. teaches organic electroluminescent elements comprising a light emitting layer between an anode and a cathode. Between the anode and the light emitting layer is a hole transporting layer containing a hole transporting material and an acceptor (with regard to claims 19 and 20). Between the light emitting layer and the cathode is an electron transporting layer containing and electron transporting material and a donor. (See Abstract). Electron transporting material blocks holes, so this layer is deemed to read upon a "hole blocking layer" (see remarks in "Response to Arguments" section below for further clarification). Materials for the acceptor include compounds having a nitro group such as TNF (trinitrofluorenone) and DNF (dinitrofluorenone) (see par. 48) per the elected acceptor species comprising an aromatic compound with a nitro group. With regard to the electron donor material, Fujita et al. teaches condensed polycyclic compounds such as pyrene, perylene, anthracene, tetracene, and pentacene (see par. 75) per the elected donor species comprising an aromatic compound with hydrogen. The amount of donor material to electron transporting material (hole blocking material) is 1-20% by weight (see par. 76) per claim 13. The electron

transporting layer (hole blocking layer) is made by a method such as spin coating method per claim 15 (see par. 77). Fujita et al. teaches an electron transport layer (hole blocking layer) of 30 nm thickness (see Examples) per claim 16. Although Fujita et al. fails to exemplify devices with all of the taught acceptor materials comprising an aromatic compound with a nitro group and donor materials comprising aromatic compounds with hydrogen, it would have been obvious to one of ordinary skill in the art at the time of the invention to have formed a device as recited in the claims and to have selected the electron acceptor and electron donor materials under consideration, because Fujita et al. teaches all of the required components of the devices of the claims.

### *Allowable Subject Matter*

15. Claims 8, 17, and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The closest prior art fails to teach the specific further layers as required by claims 8, 17 and 18.

### *Response to Arguments*

16. Applicant's arguments filed July 20, 2006 have been fully considered but they are not persuasive to overcome the rejection of claims 11-16,19, and 20 under 35 U.S.C. 103(a) as being unpatentable over Fujita et al. (EP 1017118 A2). Fujita et al. does not expressly use the term "hole blocking" to describe the electron transport layer; however, it is well known in the art that

electron transporting materials have the inherent property of blocking holes [see Kobori (US PGPub 2002/0038867), par. 192].

With regard to applicant's arguments over the election of species requirement, the examiner maintains that the species are distinct and require a separate search. The number of species to search is a serious burden, because the searches for the species are not coextensive.

The arguments with regard to the previous rejection under 35 USC 112, second paragraph, are now moot, because the rejection has been withdrawn in the present Office action.

Applicant's arguments with respect to the remaining previous art rejections have been considered but are moot in view of the new grounds of rejection.

***Conclusion***

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dawn Garrett whose telephone number is (571) 272-1523. The examiner can normally be reached Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rena Dye can be reached at (571) 272-3186. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Dawn Garrett
Primary Examiner
Art Unit 1774

September 15, 2006